Remarks

Claims 1-74 are pending, of which claims 22-58 were withdrawn. Applicants have now amended claims 63-74 without prejudice and added claims 75 and 76. Applicants respectfully request the allowance of claims 63-76.

Substance of the Examiner Interview

The undersigned attorney wishes to thank Examiner Wartalowicz for the telephone interview on October 2, 2008. Examiner Wartalowicz the undersigned attorney were present at the interview.

During the interview, the *Jia* reference (C.L. Jia *et al.*, "Effect of chemical and ion-beam etching on the atomic structure of interfaces in $YBa_2Cu_3O_7/PrBa_2Cu_3O_7$ Josephson junctions", *Appl. Phys. Lett.*, Vol 67, No. 24, 3635-3637 (1995)) was discussed. Specifically, the nature of the $PrBa_2Cu_3O_7$ layer disclosed in the *Jia* reference was discussed. The Examiner indicated that he was willing to reconsider the significance of the *Jia* reference when a response to the Office Action was submitted.

No agreement as to the merits of the claims was reached.

Claim Rejections – 35 U.S.C. § 103

Claims 1-5, 7-21 and 59-74 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over *Harada* ("Fabrication of all-high-Tc Josephson junction using as-grown YBa2Cu3Ox thin films," *Jap. J. Appl. Phys., vol. 30*, pp. L1387-89 (1991)) in view of *Chan* (U.S. 5,892,243) and either *Hunt* (Hunt, B. *et al.*, "High Temperature Superconductor Weak Links", *Second Symposium on Low Temperature Electronics and High Temperature Superconductivity,* Electrochemical Society Meeting, Honolulu, Hawaii, Vol. 93-22, p. 467-472 (May 1993)) or *Jia*. Applicants' cancellation of claims 1-63 renders the rejections of claims 1-5, 7-21 and 59-62 moot. Applicants respectfully submit that, as previously presented, claims 63-74 contain allowable subject matter. Applicant has now amended claims 63-74 to either independent form, incorporating all limitations of any base claim and intervening claims or dependent claims based on respective non-cancelled claims without intending to surrender any claim scope as

previously presented. Applicants respectfully submit that claims 63-74 are allowable as amended.

Regarding claims 63 and 64, each of the claims includes, among other things, the feature that a plurality of Josephson junction devices fabricated on a substrate have respective I_C values within a certain variability range of each other and respective R_n values within a certain variability range of each other. Such uniformity is achieved due to the uniform nature of the ion-modified barrier layer. Neither *Hunt* nor *Jia* discloses or suggest this feature. Indeed, neither reference discloses variability in junction properties. In fact, on the bottom of page 4 of *Hunt*, *Hunt* states that "The critical current densities of the ion-damage weak links appear to be relatively insensitive to ion cleaning energy and ion species, indicating that J_c in these devices is not controllable over a wide range. This is a problem for some cases in which control of J_c is required, such as integrated circuit applications." The fact that J_c is not controllable in these devices implies that they are not uniform. On page 3 of *Hunt*, *Hunt* states that "The degraded layer on the YBCO base electrode is caused by ion damage during the edge cutting and edge cleaning steps, and presumably consists of both crystalline defects and stoichoimetry shifts associated with preferential ion sputtering." *Degraded* layers, ion *damage*, crystalline *defects*, and stoichiometry *shifts* are in direct contradiction to uniform layers and indeed indicate nonuniformity. Regarding *Jia*, there is in the *Jia* reference no discussion whatever of Josephson junction parameters. Indeed, *Jia* provides no evidence that the structures discussed are even Josephson junctions, i.e., no electrical measurement are presented. For at least these reasons, Applicants respectfully request the withdrawal of the rejection of claims 63 and 64 as being unpatentable over *Harada* and *Hunt* or *Jia*.

Regarding claims 65-74, the Examiner relies on *Harada* and *Jia* for the rejection. As discussed in Applicants' Amendment submitted on April 28, 2008, including the Declaration of Prof. Rowell, *Harada* does not disclose a barrier made of an ion-modified layer of a superconducting electrode. The Amendment of April 28, 2008 is incorporated herein by reference. Further, *Harada* fails to disclose or suggest the I_C or R_n values in the ranges in claims 65-74.

As to *Jia*, the Examiner contends that it discloses a substantially similar process of making the barrier layer as that of the claimed invention such that the properties of the

barrier layer of *Jia* are substantially similar to the properties of the barrier layer of the claimed invention. Applicants respectfully disagree with the Examiner. *Jia* discloses a Josephson junction with a layered structure of $YBa_2Cu_3O_7/PrBa_2Cu_3O_7/YBa_2Cu_3O_7$, in which the $PrBa_2Cu_3O_7$ layer is a deposited non-superconducting barrier. *See, e.g., id* at Abstract (..."Josephson junctions formed by epitaxial $YBa_2Cu_3O_7/PrBa_2Cu_3O_7/YBa_2Cu_3O_7$ triple-layer films ...") and p. 3635, left column, first paragraph ("In most cases $PrBa_2Cu_3O_7$ is employed as nonsuperconducting barrier material.") The method disclosed in the present application and resulting in the device claimed in claims 65-74, in contrast, produces a barrier layer that is ion-modified from one of the superconductor electrodes. Therefore, the process in *Jia* is very different from that of the claimed invention such that the properties of the barrier layer of *Jia* cannot be predicted to be substantially similar to the properties of the barrier layer of the claimed invention. Moreover, in order for a device to be classified as a Josephson junction, it must display Josephson properties when measured electrically. *Jia* presents no electrical measurements, no measured values of I_c or R_n, and no evidence that the structures discussed operate as Josephson junctions. For at least these reasons, Applicants respectfully request the withdrawal of the rejection of claims 65-74.

New Claims

New claims 75 and 76 have added. For at least the same reasons stated above, claims 75 and 76 should be allowed.

SUMMARY

In view of the above amendments and remarks, Applicant respectfully requests a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Respectfully submitted,

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